Better Crops WITH PLANT FOOD

April-May 1935 10 Cents

The Pocket Book of Agriculture

DELMARVA'S BEST

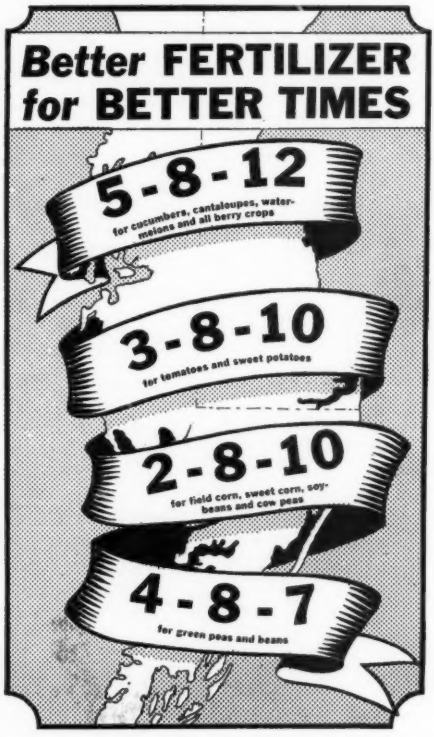
Here are four better-balanced fertilizers featured by leading fertilizer manufacturers on the Delmarva Peninsula. They are based on years of experiment and the experience of leading farmers.

5-8-12 keeps vine crops thrifty over a long period, producing cucumbers, cantaloupes and watermelons with firm meat of fine flavor. It is also the best fertilizer for berries, producing red, firm berries of excellent flavor and better size with less culls.

3-8-10 is the fertilizer to use for tomatoes for vigorous, healthy plants that produce the smooth, firm, high-quality tomatoes that are prized on all markets. 3-8-10 is also the best mixture for sweet potatoes, producing bigger yields of smooth, chunky No. 1's.

2-8-10 fertilizer makes field corn a cash crop, with ears filled out to the tip with better quality, higher-feed-value corn. 2-8-10 makes sweet corn sweeter. It helps control root rot, reduces frost injury and makes plumper grains, aiding in the formation of starch and sugar. For soy-beans and cowpeas 2-8-10 produces more hay and better seed.

4-8-7 is a fine fertilizer for peas and beans. It produces sweet, tender peas and well-filled, crisp beans with plenty of "snap."


Better FERTILIZER for BETTER TIMES
5-8-12
for cucumbers, cantaloupes, watermelons and all berry crops
3-8-10
for tomatoes and sweet potatoes
2-8-10
for field corn, sweet corn, soybeans and cow peas
4-8-7
for green peas and beans

POTASH PAYS ON ALL CROPS — NV — POTASH EXPORT INC. — TRADE MARK REG.

When you buy straight potash or potash in mixed fertilizer, it pays to make sure you get genuine **NV** POTASH—*the same potash that has helped American farmers to produce bigger yields and better quality for 50 years.*

N. V. POTASH EXPORT MY., Inc., Balt. Trust Bldg., BALTIMORE

Better Crops with PLANT FOOD

The Whole Truth — Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XX NUMBER ONE

TABLE OF CONTENTS, APRIL-MAY, 1935

Fellowship in the Furrow 3
Jeff, in Spring Spirit

Saleable Sweets 7
George R. Cobb Tells How to Make Sweet Potatoes More Marketable

The Inquiring Mind and the Seeing Eye 10
Dr. C. F. Marbut Is Subject of Dr. A. S. Alexander's Eulogistic Pen

The Soybean Is Here to Stay 13
Dr. W. L. Burlison and A. L. Lang Describe the Growing Importance of This Crop

Editorials 19

Reviews 21

Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY., INC.
of Amsterdam, Holland
Directors: J. N. HARPER G. J. CALLISTER

IF NOT A SPORT OF KINGS,—*THE* SPORT OF BOYS

Better Crops with PLANT FOOD

PUBLISHED BI-MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK, WITH OFFICES AT 19 WEST 44TH STREET, NEW YORK CITY. SUBSCRIPTION, $1.00 FOR 12 ISSUES; 10c PER COPY. COPYRIGHT, 1935, BY THE BETTER CROPS PUBLISHING CORPORATION, NEW YORK.

VOL. XX NEW YORK, APRIL-MAY, 1935 No. 1

Fellowship *in the* Furrow

By Jeff McDermid

ALONG toward corn planting time we who devoted the best young years of our lives to farm journalism sort of hanker to pile into the old bus and get right out again among the hills. You see, what was once simply a case of answering the call of the loam and the sunshine for a numberless crew of writing enthusiasts has dwindled down to an almost perfunctory pursuit vouchsafed only to a minor contingent of those gallant devotees and interpreters of rural life who still find the means through this vocation to buy their gas and groceries.

It seems rather ironical that the readers out on the farms who so enjoyed "fat books" during the boom-acre days when our weeklies were in the ascendency should be caught in the maelstrom of drought, debts, and dust storms without the friendly pages of their favorite trade journals, which were wont to come along regularly with each phase of the moon. Nat-

urally, it is tough on a lot of us, who filled those columns with advice, warning, and discriminating praise for both individualistic and cooperative agriculture, to be denied the open road, the loaded kodak, and the hearty hand clasp of earth's closest partners.

I suppose that most of us scribes were none too discerning and none too courageous even when we sensed occasional signals of economic storms, and that even if we had published our periodicals every day, the lot of the average reader would be little the better for it—at least *financially*. I am aware that a few of us sometimes deserved to have a mastiff escort us to the exit because of the precious time we took on some man's busy estate trying to reveal to his competitors how to produce just as thick sweet cream or as flourishing alfalfa, or in delving into the trade secrets of some shrewd marketing association which wanted to keep a few jumps ahead of the others.

YET there still remains a kindred bond which seldom completely severs, linking the interests of the erstwhile farm writers of the old school to the traditions and the fortunes of the furrow. No doubt, as I have intimated, many of our subscribers whom we visited like itinerant circuit-riders regarded us as professional writers, aloof from the sphere of farm experience, and they often classed us with the vendors of wonderberries, patent nostrums, and wire stretchers. I am convinced, despite the stupendous chicken dinners we have consumed in many a family circle, that they often felt a bit easier when we had departed, and that some who met us for the first time lost some of their former devotion to and confidence in the infallibility of the staid bucolic publication which their folks had taken as regularly as the almanac since the Civil War.

In justice to a majority of farm editors, however, it must be said that had there been no greater reward or more satisfying compensation than the stipend found in the pay envelopes, their ranks would have thinned out long before the advertising famine. Taking the country over, it is not likely you could have found a harder working outfit of word wrestlers and fact finders doing their steady grind for so small a recompense—in *cash*.

There were several men of this "ship's company" fit to be admirals on any journalistic or literary gunboat now sailing on the bounding waves of public favor and battering the target of opinion with reverberating center-shots. There were masters of prose who wrote brilliantly of pork and pumpkins; wizards of diction who lavished it on pasture grass and bullocks; and many an epic poet who found content in waging relentlessly against the rising tide of petty graft, poor schools, and miserable tenancy. Perchance a scrap-book here and there in some farm-house treasury supports my contention in this regard. If not, come with me on some leisure day to the libraries where dusty files repose and we will let the sunlight set forth the sparkles of forgotten journalistic gems.

BEAR in mind meanwhile that the people who read those yellowed leaves a quarter of a century ago were unpossessed of radio or daily news dispatches, yet those columns reflect their own and their leaders' opinions, which stand today like a prophetic vision of the higher aspirations and the finer principles toward which agriculture has bent its energies for the welfare of the country. Maybe the lack of so much distracting information shaped their courses more directly, and imparted to the farm journals of that day a mellow blend of craftsmanship, citizenship, and culture peculiar to none of the technical press in other major industries of America.

No doubt some of us writers fostered class consciousness and encour-

aged provincialism and sectionalism along some particular lines, and we may have overplayed pure sentiment as compensation for the injustice and the relatively meager returns which our patrons received from the soil. Granting that this is true, it is not my place to assume a caddish note of apology in this respect—and none is required.

At every call to arms, at every cry for relief of the hungry and the naked, and on every occasion when group sacrifice has glorified the humdrum existence of everyday life, you must admit that no class has responded with more unselfish devotion and disinterested sincerity than the subscribers to American farm journals.

The right and the duty to get cursing-mad one minute and then be caught dashing a tear from the rough cheek in the next is the reflection of that inherent spirit governing those who live much out-of-doors and close to plants and animals. "Tongues in trees, books in the running brooks, sermons in stones, and good in every thing—" the lashing of the summer storm ends in the peaceful twilight and the germinating freshness of rain-washed earth.

Neither am I content to gloss over so-called radicalism or class fealty among the farm leaders who have borne the brunt of the struggle. Many of them have started papers of their own, too, and snitched a little lineage on us older fellows, claiming that we had abandoned the cause or followed the easy path. In some cases they were right. In nearly all cases they were rugged. Only when they fell into the snares of political intrigue may it be said that their work was wasted. Many of these men at least had the vision of a vital brand of journalism and public service, which some of us tied to commercial hitching posts were impatient to emulate. They kept the fires hot under our boilers, even if the steam "blew" sometimes.

And after all, to be class conscious is not the cardinal sin of sins. To be conscious of the destiny of a race, or a mass of toilers within a race, and to train it properly to encourage self-reliant progress may work out well for all others who earn their bread in humble ways. The best way to kill a nation at the roots is to let its farmers become virtual peasants, too weary to be aroused, too unconscious to be militant, too indifferent to demand facts. If the American farm publishers have done no more than nurse the combined sense and sentiment of rural readers, their small salaries have been among our best national endowments.

When, as a tyro, this writer had the privilege of joining the ranks of professional farm journalism, enriched by the kindly but vigorous tutelage of a man now listed among the leading experiment station editors of America, the inspiration and tradition of the craft was at high tide. To an awe-struck, farm-minded lad, "informally" trained but reinforced by several generations of farm folks, the opportunity of enlisting in the profession as an earnest amateur seemed the height of a glorified ambition.

Consequently, I attended occasional meetings of the clan at Internationals and State fairs, or sat well forward among the winter-bound toilers at some college short course, to hear such exponents of culture in agriculture as Joseph E. Wing, Herbert Collingwood, Uncle Henry Wallace, and Alvin H. Sanders. Again, when time afforded, I exchanged greetings by letter or sub-

mitted articles to DeWitt C. Wing, Dan Wallace of Minnesota, J. Clyde Marquis of Pennsylvania, and the late James M. Pierce of Iowa, all of whom left some helpful suggestion or generous word of encouragement.

One of the happy moments I remember was on the steps of the white building on Grand Avenue in Des Moines one spring evening when James M. Pierce clasped my hand in parting to remark: "Every young man with the proper spirit to work and to learn what farm folks need to know for their own and their country's welfare will succeed in a career of agricultural writing—even though his education may lack some of the accepted things."

AS the months passed any youngster engaged in this work discovered that many of the technical precepts of newspapering could be used effectively for the improvement of these weekly country-bound journals. The elements of news sense, brevity, and accuracy of course applied to rural journalism just as they did to the daily press, and the call for more frequent photographic and line-drawn illustrations helped to illuminate pages somewhat sloughed in the mire of conservative custom. Yet from this point the paths and goals of these two classes of journalism separated.

It was clearly apparent that the daily press cared chiefly for the snap-dash of the momentary and fleeting impressions of the calendar's events, and seldom dug meatily into the substance of the forces which caused farmers to react as they often did on public occasions that merited reportorial treatment. It was their sole apparent function to tell the world about some row or scandal disrupting a funny farmers' meeting, or in shrewd estimates of the *political* significance of new rural marketing movements.

The desk editors and reporters making up the city editions were city-minded; the papers were dressed and tuned to urban approval. The power of sympathy which leads to understanding and finally to *translation* of rural ideals on a broad civic pattern —these were for the most part utterly ignored. Farmers were "queer dodos" in queerer duds—so why give space to them at the cost of a society page or a frenzied nonpareil stock market dope sheet. Their interest was in running blatant chatter written by some night-hawk of the bright-light zone, instead of finding out some of the equally human and far more constructive wayside stories close at hand.

To them, all was volume, regardless of the vacuum within that volume. Like many of their advertising clients, the daily press of that day wanted nothing but production plus from the farmers, so that the turnover would be rapid and the commissions very plentiful. Their idea of rural mathematical perfection was for the farmer to stick to his red-schoolhouse "rule of three"—one for the producer and two for the fellows who handed it to consumers. Some of them are not yet over the nightmare which the use of calculus and the slide rule has brought to the agricultural sense, or the adoption of the test-tube and the microscope in the solution of farm problems.

WITHIN later days there has been a change, partly due to the rural delivery of daily mail—a service which the farm papers themselves supplied unaided through years of publicity and "lobbying." Somewhat slow to grasp its significance, the daily press has only recently emerged with any vital service of remote value to farmers, and even that often "eats at the second table" when space is scarce.

On the other hand, the agricultural journals were often slow to recognize that the farmer was a citizen and a shareholder in state and national responsibility. Here they made an error as grievous as their cousins of the city room committed, for the interrelation of the class workers to their country

(*Turn to page* 31)

Saleable Sweets

By George R. Cobb

Salisbury, Maryland

"POTASH gives the potato more weight and starch and causes it to fill out and make a perfect crop." Serving at the time as agricultural agent in Maryland in one of the most prominent sweet potato producing counties in the United States, I naturally was vitally interested. It was in 1919 and I was attending a Farmers' Institute in an adjoining county and listening to talks given by successful sweet potato growers on the many cultural points to be observed in producing a large yield and high quality.

The speaker was E. E. Nock, one of the oldest and most successful growers, and he said that while he had been growing sweets for 33 years and still felt that he knew very little about them, one thing he had discovered and that was that "Potash gives the potato more weight and starch and causes it to fill out and make a perfect crop."

Clays Need Potash

Results of experiments conducted by the Alabama Experiment Station and by the Georgia Experiment Station were the next reports I noticed, also back in 1919 I believe. The experiments in Georgia were conducted on a clay loam and I was very much surprised that potash showed a definite increase on this type of soil as I had been taught that clay soils contained plenty of potash. Later on I learned that clay soils contained plenty of potash but that the potash was locked up and was not available to the plants

A readily marketable size.

or, as I heard Dr. Firman Bear say in a talk, "It has been raining on this good old earth of ours for thousands of years, and if a soil still shows plenty of potash, it would seem apparent that this potash is not soluble and thus not available to the plants."

Referring to the experiments at Alabama and Georgia, I found that the authors had this to say, "The significant point to notice in this experiment is the great reduction in yield when potash is omitted." In the Georgia experiment the plot where potash was applied produced per acre about 2,000 pounds more sweet potatoes than did the check. This plot exceeded in yield all other plots with the exception of the plots receiving 1,800 pounds of a complete fertilizer and the one getting 24 tons of manure.

Local growers of sweet potatoes on the Shore were in many cases applying

10 tons of manure plus from 1,000 to 2,000 pounds of kainit per acre and producing fine yields. The war came on, and potash became so scarce and expensive that growers were forced to omit that ingredient from their fertilizer mixtures. The result can be expressed in the words of H. O. Hall, one of the most extensive and successful sweet potato growers on the Eastern Shore of Virginia: "For the first and even the second year we got along all right, but each following year our yields and quality dropped until we could hardly grow a crop at all."

Potash Makes Chunks

I had the pleasure of discussing the New Jersey experiments with the investigators who discovered and proved that plenty of potash made a chunky potato, the kind that the markets demand. The ideal sweet potato, I learned, was from 4½ to 5 inches long and 2½ inches through its thickest part. These same investigators found that a chunky tuber has a large active cambium and this large cambium is directly associated with a high percentage of protein. As the lack of potash decreased the formation of protein and thus directly influenced the size of the cambium, the reason for potash producing chunky potatoes became apparent.

While attending one of the annual meetings of the Peninsula Horticultural Society being held at Camden, Delaware, I heard Dr. H. H. Zimmerley, now Director of the Virginia Truck Experiment Station, report on fertilizer tests on sweet potatoes. These tests or experiments, from 1920-1928 are fully reported and discussed in Bul. 66 of the Virginia Truck Experiment Station. I was more than surprised to hear Dr. Zimmerley tell that a 3-3-15 mixture had given the best results, as 10 per cent potash was about as high as growers and fertilizer manufacturers discussed. The recommendation was for 1,000 pounds of a 3-3-15 mixture or 750 pounds of a 4-4-20 analysis or in other words, "A fertilizer mixture which will furnish 30 pounds of ammonia, 30 pounds of phosphorus, and 150 pounds of potash per acre is recommended for the Jersey type of sweet potato on soils of moderate fertility."

Returning home from that meeting, I immediately arranged with some of our local growers to run a test the coming year comparing the 4-4-20 with the popular 2-8-10 mixture used by many of the farmers. The growers applied 1,000 pounds of the 4-4-20 mixture to one acre and 2,000 pounds of a 2-8-10 to another acre with the following results—the cost of fertilizer was $13.50 less for the 4-4-20 and the yield was exactly 42 bushels more per acre with the 4-4-20.

Experimental work conducted by Dr. F. W. Geise, of the Maryland Experiment Station, here on the Shore enabled me to participate directly in an official test. The results are stated as follows: "Potash gave the greatest increase, nitrogen second, and phosphoric acid seems to be of least importance as indicated by the small increase in yield;" and "Plots treated with muriate of potash alone or in combination with N or NP yielded considerably more marketable potatoes than any other plots included in the test."

Potash Makes Sales

One of the most important facts brought out in the above quotations is that potash produced the most "marketable" potatoes. In other words potash develops primes or number ones to a greater extent than any other element, thus securing for the grower the greatest profit or return per acre.

Another line of experimental work with sweet potatoes that was of great interest to growers on the Shore was the tests on keeping qualities. Thousands of bushels of sweet potatoes are stored each year, and any treatment that will reduce the shrinkage from

rots and natural causes is of interest. In reference to potash or other fertilizing elements injuring the keeping quality, Dr. Zimmerley states that there is no relation between the fertilizer used and storage rots and shrinkage. Dr. R. A. Jehle, of the Maryland Station, inspected potatoes from plots that were fertilized with 18 per cent potash and others from plots with much lower potash fertilizer and he found that the higher potash did not affect the keeping qualities adversely but that there was more variation between potatoes in the same row than there was in the different rows that were treated with different analyses.

The most recent tests that have come under my observation were conducted in Wicomico county this year on the farms of W. J. Hotton and J. Galen Adkins, both outstanding farmers. The layout of the plots was the same in each case, but the tests were on widely separated farms and under different farm management conditions. The comparison was as follows: Plot (1) a 3-8-10 analysis, which is very popular on the Shore for sweet potatoes; plot (2) a 3-8-10 analysis plus 200 pounds of muriate and/or sulphate of potash; plot (3) a 3-3-15, which is the official Virginia recommendation; and (4) the 3-3-15 plus 200 pounds of muriate and/or sulphate of potash per acre. The commercial mixtures were applied at the rate of 1,000 pounds per acre about two weeks after planting. The extra potash was applied about one month before planting.

As it is the custom on Del-Mar-Va Peninsula to harvest at least part of the crop early for direct shipment to market, and as an increasing number of farmers are growing their crops to full maturity and storing, those in charge of the tests decided to make two harvests, one in early September and a final harvest about the middle of October. Although the yields, as is to be expected, were smaller in the early harvests, the same persistent increase in yield developed as the potash was increased. The results of both the early and late harvests for the two tests in question are presented in the following table.

Analyzing the results of these two tests, one notices first that the 3-8-10 analysis on both farms and at both the early and late harvest dates gave the smallest yield. Where this analysis was supplemented by 200 lbs. of

(*Turn to page* 30)

Fertilized with 3-8-10.

Fertilized with 3-3-15.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

TRADITION has it that the grandparents of Dr. Curtis Fletcher Marbut, Scientist in Charge of the Soils Survey, U. S. Department of Agriculture, migrated from the mountains of Tennessee to the Ozarks of Missouri on a mule.

That story, however, is incorrect, for at the time of their journey of several hundred miles, in 1841, they had at least six children who could not well be piled onto the hybrid's back, nor could they safely cling to its tail like the pups of an opossum as "On mules we find two feet behind, and two we find before; we stand behind before we find what the two behind be for."

The fact is that the family made the long trip in a sturdy wagon, every part of which was made by grandfather Marbut. He was an accomplished mechanic of the old school, who despised wagons from the factories, accounting them cheap and flimsy. Later, however, those factory-made vehicles put him out of business and forced him to take up farming, a vocation for which he had no special liking or talent.

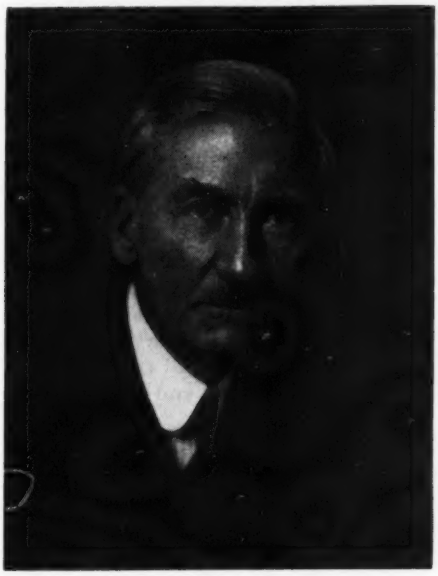
His first attempt at farming was made on the barren clay ridges of Giles county in middle Tennessee and proved a starvation experience; therefore, he and his family followed two of his sisters a year later to what is now Barry county, Missouri. Crossing the Mississippi at the Iron Banks, they wallowed their way through Nigger Wool Swamp in the southeastern Missouri lowlands, a feat of which he was intensely proud; then they turned northward to the Ozark Uplands and Iron Mountain, westward through Salem in Dent county, southwest to Hartville in Wright county, and finally west by way of Springfield. It is evident that his unfortunate experience on the sterile clay lands of Tennessee had not taught him the importance of choosing fertile land for his farming operations, for he squatted at first on a barren post-oak flat where the soil was miserably poor. A year later he had recognized his mistake, and he moved to the alluvial lands occurring in half-mile wide strips along Flat Creek.

Of Pioneer Stock

Grandfather Philip Marbut was born in 1797, probably in Newberry, South Carolina. His wife was a Thomas. They had, in time, a family of twelve sons and daughters. The pioneer lady died in 1858; and one of the married sons took over the farm. Then came the Civil War and the old man did not regain his independence and sense of leadership when the country settled down to work after that devastating struggle. He died in 1889 at the age of 92 years. Dr. Marbut remembers well his grand-

father's wagon shop, his dry kilns, and store of seasoned materials.

Dr. Marbut was born in Lawrence county, Missouri, July 19, 1863. His father's name was Nathaniel Thomas Marbut, born in Tennessee in 1837, and he was 6 years old when the family trekked to Missouri. His mother was a Hudson. Nathaniel's father trained him to do the blacksmithing work of wagon making; but on his



DR. CURTIS F. MARBUT

marriage in 1859 he settled on a tract of valley land near the old wagon maker's farm and after the war, in which he served the Union Army, remained a farmer.

Dr. Marbut is of Scottish and English blood on his mother's side of the family. They were descendants of Englishmen and Scots who "couldn't be cavaliers and wouldn't be flunkies." The family came west from the southern Appalachians. Grandfather Browning was a typical pioneer of the Daniel Boone type—a hunter who could not stand civilization. The farming necessary for the subsistence of the family was done mainly by other members of the family.

Dr. Marbut's mother spent her childhood days doing the drudgery work that usually falls to the lot of the oldest child of a pioneer family; but it developed in her a fine spirit of fortitude and efficiency. Despite the fact that few opportunities for education were offered in their isolated district, she became an ardent reader and so enriched her penetrating mind. Her son says of her: "In the welter of political conditions preceding the Civil War and in the period of intense religious emotion that swept backwoods communities in those trying times, she never lost her head. I owe more to her steady guidance in times of hesitation and doubt than to any other single influence." She died in 1892, in her early fifties, and her husband passed away in 1909 in his 73rd year.

A Rugged Childhood

It was in this primitive environment that Dr. Marbut grew up, knowing nothing of the luxuries of life, but benefited by the example of rugged, honest people who inculcated in him sterling attributes of manhood and citizenship. He worked at farm chores as soon as he could help the older folks, and learned how to "plow and sow, to reap and to mow, and to be a farmer's boy." Climbing about in the Ozark hills, working in the forest, and hunting and fishing when leisure allowed, he developed robust health and hardiness in the open air and sunshine which, throughout life, have stood him in good stead and enabled him to undertake and endure herculean tasks.

At the early age of five years he began to acquire a rudimentary education. His earliest instructor was an itinerant teacher who wandered into the neighborhood and got a few children together for "book larnin'." His parents insisted that he should not miss a single day, now that the opportunity presented, and until he was 17 years old he attended the little school through each short annual term of

about four months without a break. During that time he had become a voracious reader. His grandfather's small collection of books was to him a gold mine of entrancing treasures. There was no definite direction in his reading; but his mind was insatiable and he studied and absorbed all sorts of information which gradually stimulated him to seek a higher education.

In 1881, when 17 years old, he was granted his first certificate to teach in the district schools, largely through the liberality of the county school commissioner. This work occupied much of his time for a few years, but he also managed to attend the local school. While teaching, he boarded at home. His entire salary for teaching a whole winter term was $150.

"A Place in the Sun"

He had intended to go to Drury, a small college at Springfield, Missouri, near his home; but happening to obtain a catalogue of Missouri University, he became interested in the courses offered, and after accumulating some money by teaching and from the sale of some cattle he had bought and fed, entered the university. There he was an earnest student, but lack of funds prevented continuous attendance. He persevered, however, and was a proud lad when, in 1889, he had earned the Bachelor's degree. That honor did not, however, signify that he had attained a high plane of culture. "I was," he tells us, "still a raw, uncouth country boy;" but we feel sure that despite that modest estimate, he had acquired real ability and a keen desire to attain a "place in the sun."

His qualifications must, indeed, have attracted favorable attention, for after teaching in the village high school for eight months following his graduation he was, in 1890, made a member of the State Geological Survey. In 1893 he entered Harvard University, received his master's degree in 1894, and remained another year to complete the residence requirements for a Doctorate. During that time he wrote a thesis which later was published as one of the reports of the Missouri Geological Survey; but he was unable to return to Harvard for the final examination, and so did not receive the Ph.D. degree. That is an honor Harvard owes him, in our opinion, and which we hope will be conferred in recognition of the eminent scientific services he has rendered the Government and his fellow citizens.

From 1895 to 1897 he was instructor in Geology in the University of Missouri, assistant professor 1897-1899, and professor 1899-1910. He was director of the soil survey of Missouri, 1905-1910, special agent of the U. S. Bureau of Soils 1909-1910, and has been Chief of the Division of Soils Survey ever since the latter date. In 1899-1900 he traveled in Europe, and in 1919 in Central America. He married Florence L. Martin on December 17, 1891, and they have a family of three sons and two daughters.

He is a member of the Geological Society of America, American Society of Agronomy, Association of American Geographers, American Soil Survey Association, and of the fraternities Phi Beta Kappa, Sigma Xi, and Sigma Alpha Epsilon. In 1916 the University of Missouri honored him with the LL. D. degree. In politics he is a Democrat and in religion a Unitarian.

Awarded Cullum Medal

In June 1934 Dr. Marbut was appointed Honorary Professor of Soils in the University of Missouri where, upon retiring, he may devote a part of his time to soil research.

Dr. Marbut, the self-made lad from the Ozarks, gradually but surely has worked himself to the "top of the tree" and earned and received the esteem and approbation of all who have been interested in and benefited

(*Turn to page* 23)

Typical hay scene where soybeans are popular.

The Soybean Is Here to Stay

By Dr. W. L. Burlison and A. L. Lang

Agronomists, Illinois College of Agriculture

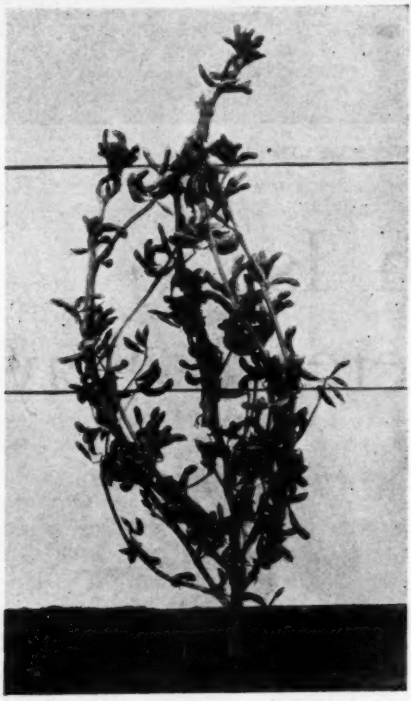
DURING the last 15 years soybeans have attained a significant place in the agriculture of many sections of the United States, particularly in the corn belt. The total production for the United States in 1934 was approximately 17,800,000 bushels according to G. C. Edler, Bureau of Agricultural Economics, or about half again as much as 1933. Illinois accounted for half this figure, while Indiana and Iowa together contributed one-fourth of the total. *This is a remarkable record.*

With hundreds of farmers trying soybeans for the first time, with the increased interest in the crop resulting from continued economic difficulties, and with small grain surpluses and continued invasion by the chinch bug and possibly the corn borer, it is no wonder that there is unusual interest of a very vigorous type in the soybean. Soybeans have many valuable characteristics which have influenced farmers to become more and more interested in them.

Space does not permit a discussion of these characteristics, but actual experience on the farm has demonstrated their high value.

Soybeans are well adapted to widely varying soil conditions. Hay and seed yields, however, are strikingly influenced by natural productive levels as well as by productive levels that have resulted as cumulative effects of systems of soil management. Those systems of soil management which are effective over a period of years on

the rotation as a whole are generally effective on the hay and seed production of this legume. Usually soybeans are more responsive to systems of soil treatment as a hay crop than they are as a seed crop. More than 150 crops from 23 soil experiment fields averaged by soil groups according to their natural productive levels furnish data for conclusions regarding the performance of this crop.



An abundance of well-filled pods is desirable in the soybean plant.

Dark-colored soils are relatively high yielding in both hay and seed. Light-colored soils are relatively low yielding. Sandy soils are intermediate with a hay yield equal to 61 per cent and a seed yield equal to 45 per cent of the most productive soil types.

Hay production on two groups of light-colored soils has been more than doubled with the use of manure and limestone, while on a third group it has been trebled with manure, limestone, and phosphate. Sandy soils also have given good response to manure and limestone. These treatments make the hay yields on the less productive soils almost as good as those on the untreated land of the better soil types. On dark-colored soils manure, limestone, and phosphate have materially increased hay yields on two of five groups. Manure and limestone without the phosphate have had similar effects on three other groups.

Yields of seed have been practically doubled on the less productive light-colored soils with a complete system of soil treatment, including limestone, phosphate, and potassium in addition to the regular residue treatment. Although increases are not large, treatment on soils of intermediate productivity has proved profitable, while on the highly productive soil types profits from treatment become practically negligible. That seed production has not been enhanced so successfully by soil-treatment practices as have hay yields is in line with response of certain other crops on which those factors that are effective in heavy foliage production are not always so conducive to good seed production. These responses varying from the simple to the complex systems illustrate the fact that no one practice can be expected to be the most profitable one for all existing conditions.

Since they are more acid tolerant than most of the widely grown legumes, it is not surprising that the above condition exists and much less surprising that soybeans show even less response to direct fertilization. As a legume it furnishes, when properly inoculated, its own nitrogen, a material usually deficient in acid soils; but if not inoculated, the soybean must depend upon the soil for its nitrogen, as it does for it mineral requirements. The plant needs little limestone on soils otherwise productive, because like many other acid-tolerant plants, it is a strong forager

(*Turn to page 26*)

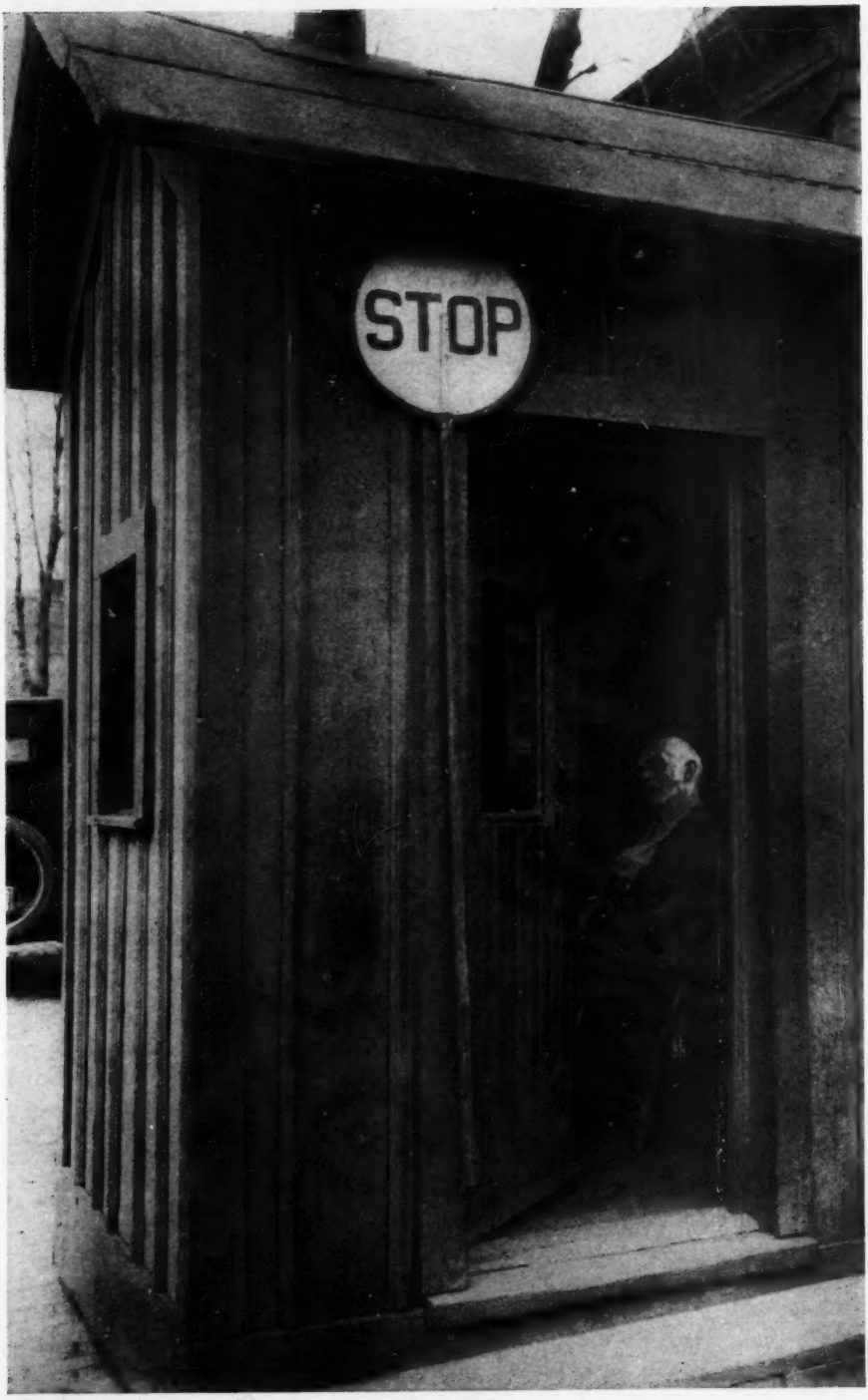
Pictorial

Above: And nothing can be done about it.

Left: Batter up—all set for a fast one.

Right: The early promise of good apples.

Below: Tung oil trees in bloom in Florida.



SPRING FEVER

The Editors Talk

The Status of Agronomic Research

In the maelstrom of our agricultural problems, one cannot help but wonder about the status of agronomic research. With its former goal of producing two blades of grass where one grew before apparently having resulted in the growing of three, where is agronomic research to turn to further its invaluable service to our national well-being?

Research in crop production is temporarily overshadowed by the difficult problems of crop prices, production control, markets and marketing, rehabilitation, and other social and economic problems. One does not have to go back far to find the steep downward trend in prices farmers received for their crops which finally reached devastating and bankruptcy levels. As income dropped each year, the condition of the farm income became more and more important. Administrative circles spent more and more time in devising methods of raising farm prices and income.

This great emphasis on prices, crop restriction, marketing, rehabilitation, etc. had two effects on research: (1) Inevitably a program of such huge dimensions, new in many of its aspects, demanded the time of administrative circles and of most of the agricultural workers in actual contact with agriculture; and (2) The old function of research being to produce two blades of grass where one grew before was questioned.

Trends and Outlook

However, the importance of agronomic research is as great as ever. And to the analyst there are apparent at least four definite trends, the importance of which will be clearly evident when the picture of all that is now taking place has been clearly etched for future generations.

The *first* of these trends is that, in contrast to the concept of inert material, the present emphasis is on the concept that soils and plants are living bodies subject to constant change. The causes, conditions, and results of these changes and the identity of substances involved are the basis of much current research work. The *second* trend is establishing a much closer and more intimate relationship between plants and soils. The *third* is a trend toward a greater inclusiveness. Research is widening its bounds, not only to include a greater emphasis on the relationship of plants to soils, but to include problems of land utilization, soil erosion, and other subjects dealing with arable acreage from the national viewpoint. These three major trends are generating a *fourth*, a trend towards a greater efficiency in methods of research and in the economy of crop production.

In spite of reduction in the volume of research and possible temporary confusion in the goal, the outlook for research in agronomy is very encouraging. It is an essential and necessary work. Whatever the marketable volume of our crops or the methods of distribution and marketing, the pro-

duction of crops of the best market grade at the lowest cost of production will be with us for generations to come. A sure foundation of efficient, low cost production is essential for a successful agriculture, and the problem of efficient production is increasing rather than diminishing.

Let research keep a sound heart growing out of a fidelity to fundamental work in the changes taking place in research and let its work, whatever its inception, be pointed straight to an ultimate relationship to the broader problems of crop production and distribution.

Science and the Depression

"It is interesting and somewhat disheartening to note that our country, with all its boasted progressiveness, has paid less official attention to science as a means of combating our present difficulties than any of the other great powers." So says Dr. Karl T. Compton, President of the Massachusetts Institute of Technology, in an article titled, "The Government's Responsibilities in Science," appearing in the April 12 issue of *Science*.

Admitting that the range of opportunity in science in this country is so great and the extent to which the government should undertake responsibility in this field involves such complex considerations that it is perhaps rash to undertake a discussion of the problem, Dr. Compton attempts to sketch briefly the problem of the government's present responsibilities in science and gives some suggestions as to ways in which these responsibilities may profitably be extended.

"The truth is," he says, "that we have been fortunate enough to have great natural resources, which we have exploited riotously; we have had a pioneering spirit which has bred some great inventors; this same pioneering spirit has developed some industrial giants who have plunged into big things and have brought 'quantity production' into operation; we have been blessed with a few great philanthropists whose altruistic vision has led them generously to support scientific work and other activities for human welfare in universities and other private institutions. But, as a people and therefore as reflected in our national policies, we have been more lucky than intelligent. Now that we are no longer able to thrive on the unrestricted exploitation of the gifts of nature, it is imperative that we take steps to utilize our resources more intelligently and effectively, and this means scientific research on an increasing scale.

What Is Needed?

Dr. Compton concludes that what this country needs is a bilateral program for putting science to work for the national welfare. There is needed on the one side the cooperation of the scientists of the country generally, to assist the government in putting the work of its scientific bureaus on a scale of maximum efficiency and value. There is needed on the other hand a new type of government leadership whereby the scientific men of the country may be brought together to make an intelligent and coordinated attack on the great problems which are facing the country at those points at which science may offer hope of alleviation or solution.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The extent and diversity of the work carried on by the Bureau of Chemistry and Soils of the U. S. Department of Agriculture are shown in the Annual Report of Dr. Henry G. Knight, Chief of the Bureau. Investigations are conducted on many practical problems of immediate interest to the farmer and other groups. The report contains too many items to be considered here, but its perusal will reveal much interesting and valuable information.

"Grades of Fertilizers for Corn and Cotton," Agr. Exp. Sta., Auburn, Ala., Cir. 70, Feb. 1935.

"Fertilizer and Fertilizer Material," Dept. of Agr., Montgomery, Ala., Dept. Bul. 24, Fiscal Year 1933-34, *Seth P. Storrs.*

"Quarterly Bulletin," State Board of Agr., Dover, Del., Vol. 24, No. 4, Fertilizer-Seed Report, July-December 1934, *Miscellaneous, January-December* 1934, *for Quarter Ending Dec.* 31, 1934, *H. H. Hanson.*

"Studies on Firmness and Keeping Quality of Certain Fruits," Agr. Exp. Sta., College Park, Md., Bul. 366, July 1934, *E. S. Degman and J. H. Weinberger.*

"Fertilizer Recommendations," Ext. Serv., Univ. of Del., Newark, Del., Informa. Card No. 22, Jan. 1935.

"Maryland Fertilizer Facts for 1934," *Agr. Exp. Sta., College Park, Md.*

"Report on Phosphate Investigations During 1934—*Part I. Tests with Legumes and Grains; Part II. Tests with Potatoes," Agr. Exp. Sta., Bozeman, Mont., Bul. 296, Jan.* 1935, *Jesse Green.*

"Inspection of Commercial Fertilizers," Agr. Exp. Sta., Amherst, Mass., Control Series, Bul. 74, Nov. 1934, *H. D. Haskins.*

"Inspection of Agricultural Lime Products," Agr. Exp. Sta., Amherst, Mass., Control Series, Bul. 76, Dec. 1934, *H. D. Haskins.*

"Fifth Annual Fertilizer Report," Feed Fert. Control Office, State College, N. M., Mar. 15, 1935, *F. E. Oakes.*

"Report of Analyses of Commercial Fertilizers Sold in New York State—July 1, 1933 *to June* 30, 1934," *Dept. of Agr. and Markets, Albany, N. Y., Bul. 290, Sep.* 1934, *Charles H. Baldwin.*

"Commercial Fertilizers in 1933-34," *Agr. Exp. Sta., College Station, Tex., Bul. 498, Nov.* 1934, *G. S. Fraps and S. E. Asbury.*

"Fertilizer Studies with Sugar Beets in the Arkansas Valley Area, Colo., 1921-28," *U. S. D. A., Washington, D. C., Cir. 319, Aug.* 1934, *L. A. Hurst and A. W. Skuderna.*

Soils

"The Physical and Chemical Characteristics of the Soils from the Erosion Experiment Stations—Second Report," U. S. D. A., Washington, D. C., Tech. Bul. 430, Aug. 1934, *H. E. Middleton, C. S. Slater, and H. G. Byers.*

"Studies on the Irrigation of Pear Orchards on Heavy Soil Near Medford, Oreg.," U. S. D. A., Washington, D. C., Tech. Bul. 432, Aug. 1934, *M. R. Lewis, R. A. Work, and W. W. Aldrich.*

Crops

Eighteen Annual Reports are among the publications listed below. There is no better time than early spring for these summaries to come into circulation. At this season farmers with renewed hope are making their plans, and much guidance can be obtained from these reports on the past year's work of their experiment stations. In addition, many States issue outlook reports, some of which will be found listed under "Economics."

"Forty-fourth Annual Report—Fiscal Year Ending June 30, 1933," *Agr. Exp. Sta., Auburn, Ala.*

"New Facts for California Farmers," (Biennial Report 1933-1934—June 30), Univ. of Calif., Berkeley, Calif., C. B. Hutchinson.

"Proceedings Sixty-seventh Convention of California Fruit Growers and Farmers, Riverside, California, December 18, 19, and 20, 1934," Mo. Bul., Dept. of Agr., Sacramento, Calif., Vol. XXIV, No. 1, Jan. 1935.

"What Research Has Done for Subtropical Agriculture," Univ. of Calif., Berkeley, Calif., Nov. 1934, Herbert J. Webber.

"The Suwannee Cowpea," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 472, Feb. 1935, Geo. E. Ritchey.

"Annual Report for the Fiscal Year Ending June 30, 1934," Agr. Exp. Sta. Gainesville, Fla., Wilmon Newell.

"Winter Legume Cover Crops for the Coastal Plain of Georgia," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Bul. 23, Mar. 1934, J. L. Stephens.

"Muscadine Grapes," Ga. Exp. Sta., Experiment, Ga., Bul. 185, Nov. 1934, W. D. Armstrong, T. A. Pickett, and M. M. Murphy, Jr.

"Irish Potatoes at Georgia Mountain Experiment Station," Ga. Exp. Sta., Experiment, Ga., Cir. 103, Dec. 1934, J. E. Bailey.

"Apples for North Georgia," Ga. Exp. Sta., Experiment, Ga., Cir. 104, Jan. 1935, J. E. Bailey.

"Report on Agricultural Research for the Year Ending June 30, 1934," Agr. Exp. Sta., Ames, Iowa, R. E. Buchanan.

"Preliminary Studies of the Length and Uniformity of Staple of Louisiana Cotton Varieties," Agr. Exp. Sta., Baton Rouge, La., La. Bul. 259, Nov. 1934, H. B. Brown.

"A Study of the Physical and Chemical Properties of Red Clover Roots in the Cold-Hardened and Unhardened Condition," Agr. Exp. Sta., College Park, Md., Bul 370, Nov. 1934, Glenn A. Greathouse and Neil W. Stuart.

"Blueberry Culture in Massachusetts," Agr. Exp. Sta., Amherst, Mass., Bul 317, Feb. 1935, John S. Bailey and Henry J. Franklin.

"Comparative Values of Farm Crops Grown at the Central and Branch Stations in Yield Trials," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 312, Dec. 1934, H. K. Hayes and Carl Borgeson.

"Starting the Orchard," Agr. Exp. Sta., Columbia, Mo., Cir. 181, Dec. 1934, T. J. Talbert.

"A Forward Look—The Fortieth Annual Report July 1, 1932 to June 30, 1933," Agr. Exp. Sta., Bozeman, Mont., F. B. Linfield.

"Forty-seventh Annual Report," Agr. Exp. Sta., Lincoln, Neb., Feb. 1, 1934, W. W. Burr.

"Quality of Cotton Produced in New Mexico, 1928-1932," Agr. Exp. Sta., State College, N. M., Bul. 225, July 1934, James R. Kennedy and John C. Overpeck.

"Fifty-third Annual Report for the Fiscal Year Ended June 30, 1934," Agr. Exp. Sta., Geneva, N. Y., U. P. Hedrick.

"Winter Injury to Fruit and Nut Varieties in New York State," Agr. Exp. Sta., Geneva, N. Y., Cir. 156, Jan. 1935.

"The Herb Garden," Agr. Exp. Sta., Geneva, N. Y., Cir. 157, Feb. 1935, G. P. Van Eseltine.

"Irish Potato Manual for 4-H Club Members," Agr. Exp. Sta., State College Station, Raleigh, N. C., Ext. Cir. 204, Dec. 1934, H. R. Niswonger.

"Pruning the Apple Tree," Agr. Exp. Sta., State College Station, Raleigh, N. C., Ext. Cir. 205, Feb. 1935, H. R. Niswonger.

"The Total Calcium, Phosphorus, and Nitrogen Content of Native and Cultivated Plants in the High Plains of Oklahoma and a Study of the Mineral Deficiencies That May Develop in Livestock When Emergency Feeds Are Fed," Panhandle Agr. Exp. Sta., Goodwell, Okla., Bul. 56, Mar. 1935, Harley A. Daniel.

"Applied Research Contributions to Oregon's Agricultural Income—A Biennial Report of Activities and Accomplishments 1932-34," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 334, Dec. 1934, Wm. A. Schoenfeld and Ralph S. Besse.

"Forty-Seventh Annual Report for the Year Ended June 30, 1934," Agr. Exp. Sta., Clemson College, S. C., Dec. 1934, H. W. Barre.

"Forty-Sixth Annual Report 1933," Agr. Exp. Sta., Knoxville, Tenn., James D. Hoskins.

"Lespedeza Sericea," Agr. Exp. Sta., Knoxville, Tenn., Bul. 154, Feb. 1935, C. A. Mooers and H. P. Ogden.

"The Japanese Persimmon in Tennessee," Agr. Exp. Sta., Knoxville, Tenn., Cir. 51, Dec. 1934, Brooks D. Drain.

"Rye for Pasture and Seed in Tennessee," Agr. Exp. Sta., Knoxville, Tenn., Cir. 52, Jan. 1935, L. R. Neel.

"The Production of Winter Vegetables in the Lower Rio Grande Valley," Agr. Exp. Sta., College Sta., Tex., Cir. 73, Dec. 1934, W. H. Friend.

"Peanut Growing in the Gulf Coast Prairie of Texas," Agr. Exp. Sta., College Sta., Tex. Bul. 503, Jan. 1935, R. H. Stansel.

"Forty-Fourth Annual Report for the Fiscal Year Ended June 30, 1934," Agr. Exp. Sta., Pullman, Wash., Bul. 305, Dec. 1934, Edw. C. Johnson.

"Aiding West Virginia Agriculture Through Research—Report of the West Virginia Agricultural Experiment Station for the Biennium Ending June 30, 1934," Agr. Exp. Sta., Morgantown, W. Va., Bul. 263, Dec. 1934.

"Forty-Fourth Annual Report 1933-1934," Agr. Exp. Sta., Laramie, Wyo., J. A. Hill.

"Report of the Chief of the Office of Experiment Stations, 1934," U. S. D. A., Washington, D. C., J. T. Jardine.

"Methods of Reestablishing Buffalo Grass on Cultivated Land in the Great Plains," U. S. D. A., Washington, D. C., Cir. 328, Aug. 1934, D. A. Savage.

"Bur-Clover Cultivation and Utilization," U. S. D. A., Washington, D. C., Farmers' Bul. 1741, Dec. 1934, Roland McKee.

Economics

"Types of Farming in Idaho—Part II—The Type of Farming Areas," Agr. Exp. Sta., Moscow, Idaho, Bul. 208, June 1934, Neil W. Johnson and Harold A. Vogel.

"Agricultural Outlook for Illinois 1935," Agr. Exp. Sta., Urbana, Ill., Cir. 426, Dec. 31, 1934, H. W. Mumford.

"Effects of Inflation and deflation upon Nebraska Agriculture, 1914 to 1932," Agr. Exp. Sta., Lincoln, Neb., Res. Bul. 71, June 1934, H. Clyde Filley.

"Rural Homes for Non-Agricultural Workers—A Survey of Their Agricultural Activities," Agr. Exp. Sta., Wooster, Ohio, Bul. 547, Feb. 1935, F. L. Morison and J. H. Sitterley.

"Cooperative Vegetable Marketing Associations of the Lower Rio Grande Valley," Agr. Exp. Sta., College Sta., Tex., Cir. 74, Jan. 1935, W. E. Paulson.

"The Agricultural Outlook for 1935," U. S. D. A., Washington, D. C., Misc. Pub. 215, Nov. 1934.

"Alfalfa Hay an Economical Feed for Dairy Cows," Agr. Exp. Sta., Pullman, Wash., Ext. Cir. 23, Feb. 1935, J. C. Knott and C. C. Hampson.

"Consumer Preferences for Potatoes," Agr. Exp. Sta., Madison, Wis., Res. Bul. 124, Nov. 1934, Henry H. Bakken.

The Inquiring Mind

(*From page* 12)

by his splendid achievements in soil survey work. He must have felt well repaid for his efforts when, on February 25, 1930, he was awarded the Cullum Medal of The American Geographical Society at a banquet held in New York City. The medal bears the inscription *For his Geographical work on the soil, "the foothold of all things."* It is the medal which, in years past, has been awarded to the most famous geographers of the world, including Peary, Nansen, Scott, Murray, and Shackleton.

The honor was richly deserved in consideration of Dr. Marbut's many years of direct supervision of the soil survey work of the U. S. Department of Agriculture. Up to the time of the presentation, more than 880,000,000 acres, approximately half of the agricultural land of the United States, had been examined, mapped, and described as to soil character, quality, and adaptability for agricultural purposes. The total has far exceeded that figure today.

"Probably no man living," says Dr. A. F. Woods, director of the scientific work of the Department of Agriculture, "has a wider or more intimate scientific knowledge of soils of the world." In 1899, Dr. Marbut spent a year in examining and classifying the soils of every country in western Europe except Spain. In 1918 he directed the work of classifying the soils of Africa. His report of this study, "Vegetation and Soils of Africa," written in collaboration with Dr. H. F. Shantz, was published by the American Geographical Society in 1923.

The Official Record of the U. S. Department of Agriculture for February 27, 1930, stated that Dr. Marbut was, at that time, chairman of the International Commission on Genesis, Classification, Morphology, and Mapping of Soils. He presided over the sessions of that commission held in May 1929 in the Free City of Danzig. As chairman of the subcommission on mapping the soils of the Americas, he has made a study of the soils of South America, in addition to his lifelong study of the United States, upon which he was to report at the

triennial meeting of the International Soil Congress held in Leningrad July 1930.

The soil study and survey work (pedology) in which Dr. Marbut has so long been engaged is regarded by Dr. Woods as the most important of all the work that is going forward, because the agricultural problem today can be solved only by getting facts and applying them to the present situation. It lies at the foundation of our whole program of agriculture. In addition to the great economic benefits to be gained from the use of the soil survey as a guide to the selection of soils and the adaptation of the proper land to the right crop, the soil surveyors say that this work has revealed erosion as the greatest menace to the fertility of the American soil and has pointed to the means of solution by establishing the characteristics and location of those soils peculiarly liable to loss from rainwash and gullying. Hugh H. Bennett, specialist in erosion and field inspector of the U. S. Bureau of Chemistry and Soils, once stated that there is 21 times more annual loss of plant food from rainwash than from cropping. The character of the soil is also the most important factor determining the appraisal of rural lands for taxation assessment and determining land values. The appraisers of the Federal Land Bank have made the utmost use of all available soil maps in carrying out the program of the Farm Credit Administration.

Difference in View

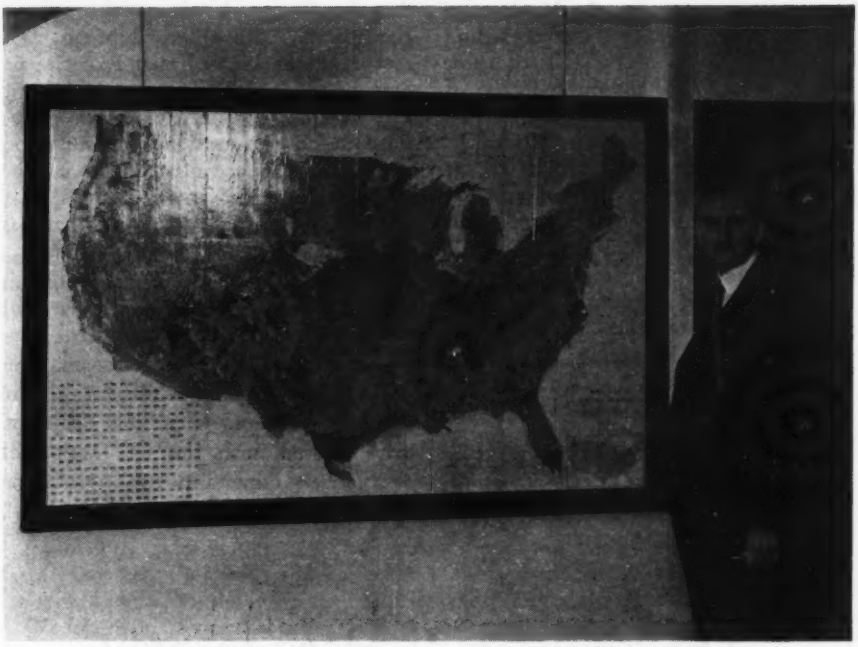
Dr. Marbut explains that the point of view maintained by the pedologist is different from that of the geologist. The latter studies his geologic section from the point of view of the physical processes by which the materials were accumulated and the historical succession of the several layers of successively overlying beds. The pedologist studies his soil section or "soil profile," as he calls it, from the point of view of processes by which the successively overlying layers of material that he finds were developed in place after the geological processes of accumulation had finished their work. He studies these processes as the product of environmental forces acting on the spot, through a period of time.

Since the soil as such differs from the layer of unconsolidated geological material of which it is geologically a part, in such a way as to show that the changes wrought in the original material to produce the soil acted from above downward, he soon realizes that his soil is the product of the environmental forces working on the earth's surface of which he learns, by broad geographic correlation studies, that climate and natural vegetation are the two principal ones. He finds it necessary, therefore, to look upon the soil as the result of an evolutionary rather than a mere physical development. In that sense therefore, the soil becomes, not an organism or even organic, but a body related more closely in its fundamental nature and its processes of development to an organic body than to a physical body.

Map of U. S. Soils

The soil characteristics are an expression of the soil's capacities. The agriculture must therefore reflect those characteristics. The soil units shown on a soil survey map have been determined on the basis of these same characteristics and on no other basis. It is inevitable, therefore, that a close relationship exists between the soil map and the type of agriculture on the same area. "It is the only line of research," says Dr. Marbut, "in which the soil is studied in relation to the plant cover, and in which a correlation is made between the characteristics and successful growth of given plants and the characteristics of a given soil."

Soil scientists of the Department of Agriculture have recently prepared a large map with many colors showing the facts made available by the soil



Dr. Marbut explaining the soil map of the United States in 250 color patterns.

survey. It is on a scale of 1 inch to 40 miles. Although necessarily very general, it gives the location of groups of similar soils shown in detail on the county soil maps published on the much larger scale of one inch to the mile. While this large map of the country does not furnish the detailed data necessary in comparing one farm with another, it does allow important regional comparisons. It furnishes the best summary of the soil resources in this or any other country.

Professor A. R. Whitson, Chief of the Soils Department of the University of Wisconsin, regards the late Dr. E. W. Hilgard (1833-1916) as the great American pioneer in the development of the science of Pedology. During the very earliest periods of the development of that science in Europe, he was actively engaged in the study of the influence of climate and vegetation on soils. Other American soil scientists who were engaged in the wide-spread study of the soils of the country, in connection with the soil survey being made by the Federal government, scarcely appreciated Dr. Hilgard's point of view; but when Dr. Marbut took charge of the survey in 1910 he also recognized that the correlation of the soils with the rock material from which they were derived does not furnish an adequate basis for their classification.

According to Prof. Whitson, Dr. Marbut then began his major life work, which has been the fundamental study of the principles of pedology and their application to the interpretation of the origin and physical and chemical character of the soils of the United States, and of several other regions he has investigated. Almost alone he has, by indefatigable labor in the field, laboratory, and library, brought the science of pedology in this country to a more perfect state of development than has been reached even in the European home of that science. His work in the Amazon Basin and in the interpretation of all available literature on the climate,

vegetation, and soils of Africa also has given rise to suggestions regarding the interpretation of the soils of those regions which will undoubtedly be of great assistance in their further study. Professor Whitson believes that Dr. Marbut will unquestionably be recognized in the future as "one of the greater leaders of this generation in the development of agricultural science."

At the annual dinner of the American Soil Survey in honor of Dr. Marbut in Washington, D. C., on November 20, 1934, Dr. Henry G. Knight, Chief of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture, said, "One of the finest things about Dr. Marbut is his personality. Through it he has profoundly influenced not only the soil survey in America but soil science throughout the world." Dr. J. G. Lipman, Director of the New Jersey Experiment Station, added, "When you think of Dr. Marbut, give him credit as a pioneer in an international organization that can deal more effectively with the problems of land, and remember that he has contributed something that has increased the good will of nations."

Now that he has returned to his "old stamping ground" in the land of the Missouri mule, we hope Dr. Marbut will still be able to roam over those beloved Ozark hills as he did when young, and spend his declining days blessed with the satisfaction of work well done and of approbation richly earned and cheerfully rendered.

The Soybean Is Here to Stay

(*From page* 14)

for soil minerals such as calcium, phosphorus, and potassium.

The soybean is a better crop to precede corn than a non-legume crop such as timothy, but it is not as good as the more deep-rooting legumes such as red clover or alfalfa. This is illustrated in the following data from the experiment field at Mt. Morris.

Three-Year Average Yield of Corn

After timothy was removed for hay	45 bu. an acre
After soybeans were removed for hay	51 bu. an acre
After red clover was removed for hay	61 bu. an acre
After alfalfa was removed for hay	64 bu. an acre

There are literally hundreds of varieties of soybeans, but the choice for a given locality should be made with care. Plant breeders are doing a good job of creating new types of soybeans. Illinois has produced the Illini soybean; Indiana the Dunfield; and so on through the list of soybean states, each with its favorite kind. To mention the best variety for each state and each purpose would take more space than is here available.

For the successful production of soybeans a good seed bed is a first requisite. The seed bed must be firm with loose soil to cover the seed well and sufficient moisture to start germination promptly. The ideal seed bed is prepared either by fall or early spring plowing. Harrowing or light discing at frequent intervals during April and May is desirable in order to kill as many weeds as possible before seeding.

Thorough inoculation of the soybean is essential. The value of inoculation is not limited to its influence upon subsequent crop yields. Immediate benefit is obtained in the form of increased yields of beans. Furthermore the bean crop itself contains a higher percentage of protein when inoculated than when uninoculated.

Under conditions which prevail generally in the corn belt, the proper date to seed soybeans is about the time corn is planted. With most varieties late planting should be avoided, especially if the crop is to be grown for seed, since practically all common varieties require the entire season to mature. Early planting will usually be accompanied by somewhat earlier ripening, although the difference in time of maturity will not be so great as the difference in time of planting. The chief reason for not seeding soybeans as early as corn-planting time is to enable the grower to kill "another crop of weeds."

There are two common methods of seeding soybeans, one is in rows to permit cultivation and another where the grain drill is used, which enables the farmer to seed the beans solid in the same manner as wheat or oats.

Whether the crop is to be grown for hay or for seed will influence somewhat the method of seeding. Soybeans can be grown satisfactorily when seeded solid with the grain drill if the land has been carefully prepared and if there is no objection to the presence of some weed grasses in the crop at harvest time. If the grower expects to keep out weeds or if he desires to use a minimum amount of seed, he should plant in rows 18 to 32 inches apart depending upon the machinery available.

Proper cultivation of the soybeans cannot be overemphasized. Most effective cultivation will usually be done "before the beans are planted," that is, killing the weeds by cultivating the land before the planting is done. It is frequently advisable and sometimes necessary to cultivate beans once before they come through the ground. In soils that tend to crust badly, it is desirable to break up the hard surface two or three days before the beans are ready to come through. The plants are easily broken off just as they are coming up and frequently, unless given assistance, will "break their necks." The rotary hoe is excellent for breaking the crust, and the spike-toothed harrow is also satisfactory. Beans seeded in rows are commonly cultivated with corn machinery. Cultivation should be frequent enough to keep down the weeds at least until the beans are tall enough to shade the ground. Two or three cultivations after the beans are well up will be found sufficient.

There is a growing interest in soybeans for hay. Up to 1934 about 56 per cent of the bean crop grown in this country was used for hay. With the drought and the shortage of forage last year, soybean hay saved the

Field of Illini soybeans in 24-inch rows.

situation on thousands of farms. Early cut hay is probably richer in protein but hay cut after the seeds are well formed and before the leaves fall gives the greatest total yield. Discolored soybean hay may not be quite so nutritious as that made without exposure to rain, but it nevertheless is of good feeding value.

An average yield of medium-maturing soybeans on fertile soils may range from 2 to 3 tons of hay per acre. On the less fertile soils beans of the hay type such as the Virginia and Wilson should yield from about 1¾ to 2½ tons. The mower is the implement commonly used for cutting the hay crop. The binder, favored by some growers, has disadvantages. When cut with a mower, soybeans are usually allowed to remain in the swath for a day or so for wilting, after which they are raked into windrows where they may be allowed to complete curing or, as is sometimes done after a day in the windrow, they may be piled into cocks or bunches to complete the curing. Under favorable conditions a good quality of hay can be made directly from the windrows.

Harvesting the Seed

The soybean seed crop should be cut when the pods are fully matured, the seed in the hard-dough stage, and, with most varieties, when the leaves are practically all off. There is no time, however, when soybeans can be cut and produce a crop of good hay and at the same time make a high quality seed crop. The hay will usually be cut three weeks or a month before the seed crop is ready for harvest. The grain binder is generally used for harvesting the seed crop, but some varieties, especially on poor soils, grow so short that it is necessary to use the mower. When cut with a binder, soybeans are handled practically the same as any other grain. Bundles should be comparatively small and not bound too tightly. They should be set up in small shocks and allowed to cure.

Some growers, after producing a good crop of soybeans and harvesting them efficiently, have had difficulty in getting the crop threshed. The ordinary grain separator will thresh soybeans satisfactorily after a few adjustments. The speed of the cylinder must be reduced to practically one-half the normal threshing rate. Even though the small grain separator is very effective, the combine is coming rapidly into use in the central cornbelt states and is used as much for beans as for wheat.

The fact that this legume proved to be a valuable high-protein roughage led farmers to consider the soybean as a companion crop to be planted with corn to serve as fall pasture, especially for hogs. Thousands of acres are now used to advantage in this manner. Where this mixed planting is practiced, the yield of corn is likely to be somewhat reduced. There is an indication that when the two are grown together the soybeans protect the corn from chinch bugs.

The method of handling soybean seed immediately after threshing is important. Beans which test more than 12 per cent moisture at threshing time should be examined frequently when stored in large lots. If the moisture content exceeds 15 per cent, the beans either should be spread out to permit frequent stirring or put in bags. Where only small lots are handled, the threshed beans are sometimes put in loosely woven burlap sacks.

Uses Rapidly Increasing

The industrial utilization of the soybean has developed very rapidly, especially during the last five to ten years. Utilization of soybean oil is attracting thoughtful attention. There is a demand for soybean oil in edible products, paints, varnishes, linoleum, soaps, and for a variety of other miscellaneous purposes. Although soybean oil has a wide range of usefulness, certain desirable outlets have

COMMODITIES IN WHICH SOYBEANS OR SOYBEAN PRODUCTS ARE USED

(A partial list)

Food Products

Soybean flour
Soybean meal flour
Refined edible soybean oil
Soybean salad oil
Chocolate bars (30% soybean flour)
Cocoa (up to 60% soybean flour)
Sausages (up to 50% soybean flour)
Bread (7½% soybean flour)
Rolls (10% soybean flour)
Macaroni (20% soybean flour)
Soybean muffins
Soybean cookies
Soybean doughnuts
Vegetable shortening
Infant foods
Diabetic foods
Oleomargarine
Lard substitutes
Filled sweets
Soybean sprouts
Soybean cheese
Soybean milk
Soybean buns
Soybean ice cream
Soya Cream Biscuits
La Choy—Soy Sauce
Soyolk (flour)
Soy Biscuits
Soy Flour
Vi-Zoy
Lektizoy
Zoy Soup
Zoybeans (cooked beans)
Bacon and Zoy Beans
Zoy Bouillon
Soy Bean Biscuit
Casein Gluten Flour
No-fat Mayonnaise
Fatless Spread
Fluffo

Canadian Products

Milqo (soy milk)
Vi-tone (chocolate)
Soya Flour
Soyex-Malt-Cocoa Drink
Soyex
Macaroni

Feed Products

Cake or meal
Commercial feed
Dairy feed
Dairy chow
How chow
Poultry chow
Dog chow
Chicken chowder
Steer fatena
Claf chow
Lay chow
Rabbit chow
34% protein chow chow
24% protein chow chow
Chick startena
Chicken fatena
Olelene
Grainola

Industrial Products

Paint
Varnish
Enamels
Oilcloth
Linoleum
Printer's ink
Glycerine
Celluloid
Lauxtex plastic wall coat
Lauxeine waterproof soybean glue
Lauxein emulsifier
Soap
Core binders
Rubber substitutes

been somewhat restricted. The quality of soybean oil has varied widely in the past, but this is being rapidly overcome, and the oil now coming on the market is a much finer product than formerly. Indeed developments in processing and refining have been so improved in recent years that today's product is more uniform in quality and altogether superior to imported oil.

About 6,000,000 pounds of soybean oil, or one-sixth of the oil from the 1930 domestic crop, were used in edible products. Hydrogenated soybean oil is being used successfully in salad oils and as lard substitutes. Soybean oil has been given a good deal of publicity for paint and varnish purposes. There are a number of paint concerns now placing soybean oil paint on the market. When it

is realized that we import more flax seed than we grow, it is only just that we find a substitute for this import product. The farmer has a growing conviction that, "If we buy your paint, you buy our oils." There is a rather definite demand on the part of the farmer now to have a paint with a larger amount of soybean oil.

Products derived from the soybeans grown in this country are many. The foregoing is a partial list of such products actually being placed on the market in the United States and Canada. This list is rapidly growing and is not intended to be complete. It gives, however, some idea of what the future holds for the soybean.

Strawberries Thrive Best in Neutral Soil

Strawberries grow better in North Carolina if the grower is careful not to let the soil become too acid, fertilizer tests revealed. The best fertilizer mixture for the rather sandy strawberry soils of the Carolina coastal plain, according to R. A. Lineberry of the United States Department of Agriculture, proved to be a mixture containing 5 percent nitrogen, 8 percent phosphoric acid, and 6 percent potash. Increasing or decreasing the proportion of either the nitrogen or the potash made the mixture less desirable. In the tests the fertilizer was applied semi-annually, 750 pounds to the acre in August and the same amount in November. Liming the soil until it was almost neutral in reaction favored vigorous growth in the plants.

Saleable Sweets

(*From page 9*)

extra potash (either muriate or sulphate) there was a decided increase in yield on both farms.

Comparing the 3-8-10 with the 3-3-15 analysis on both farms and for both early and late harvests, the 3-3-15 in each instance gave significantly larger yields. It will be observed also that in every case the 3-3-15 analysis plus 200 lbs. (muriate or sulphate) produced decidedly larger yields than the 3-3-15 alone.

Viewing the results broadly and as an eye-witness to the several harvests, the only conclusion possible is that under the conditions of these tests the 3-3-15 analysis greatly outyielded the 3-8-10, and that neither of these analyses alone gave as large a yield as when supplemented by 200 lbs. of extra muriate or sulphate of potash. The soils on both of these farms would be classed as of moderate fertility at least and were fairly well supplied with organic matter. Soil tests showed the soils of both farms to have a pH of 6.0, both medium in phosphorus and both well below medium in reserve potash.

In addition to the facts discussed relative to these demonstrations, I want to quote from those who had supervision of the work: "The real significance of the higher potash analysis or ordinary analysis plus extra potash broadcast is that it gives a higher percentage of primes as well as larger yields in the early season harvest, which if prices are fair, may mean vastly larger profits." "Of sig-

SUMMARY OF FERTILIZER TESTS

on farms of J. Galen Adkins, Salisbury, Md., and W. J. Hotton, Mt. Hermon, Md.

Name, Address, and Soil Type	Fertilizer Analysis	Amount per Acre Lbs.	Yield Primes Bus. Per A. Sept. 10th	Increase Primes Due to Potash	Yield Primes Bus. Per A. Oct. 15th	Increase Primes Due to Potash
J. Galen Adkins Salisbury, Md.	3-8-10	1000	200		250	
Norfolk sandy loam	3-8-10 & Muriate	1000 200	337	137	375	125
(1934)	3-3-15	1000	275		370	
	3-3-15 & Muriate	1000 200	400	125	520	150
W. J. Hotton Mt. Hermon, Md.	3-8-10	1000	170		433	
Norfolk sandy loam	3-8-10 & Sulphate	1000 200	208	38	600	167
(1934)	3-3-15	1000	243		466	
	3-3-15 & Sulphate	1000 200	380	137	533	67

nificance in the late harvest is the fact that there was a very small percentage that might be classed as 'Jumbos'. And, too, total yields of primes about doubled."

It doubtless would be of interest to discuss the rotations followed on these farms, methods of setting plants, number of times cultivated, chemical soil tests, etc., but space will not permit. The yields, however, will show the experienced grower that the cultural practices must have been nearly ideal and that soil conditions and weather conditions were favorable.

Testimonials from growers are very easy to obtain and as a result are not often believed, but in talks with both of these growers and other growers who either saw or knew of the results with the extra potash, these statements were heard: "I wouldn't have believed it possible, and I am surely going to use extra potash next year."

Fellowship in the Furrow

(*From page 6*)

and to each other gradually became the issue of the age.

"Spot news" of a broad state and national or international nature cannot well be recounted freshly as of yore in the less frequent appearing

technical farm press. As means of spreading spot news increased, the frequency and the size of many farm journals have decreased.

Yet it would seem that the mere first telling of news and the first startling disclosure of an event affecting agriculture or its related industries by no means ends it. Such events only fire a spark in a string of tinder. The size of the bonfire or its final effect on the lives and fortunes of the farmers depends largely on the consideration given to that eventful spark and the mental reactions ensuing long after the spot news has been forgotten.

Where else but in the thoughtful columns of comment, discussion, and aftermath reporting open still to worthwhile, alert farm journals, may the rural citizen truly weigh and gauge the forces developing in the wake of changing news events? More reader comment, more contact with farmers instead of less—these are essential to the destiny of modern agricultural papers. Hasty acceptance of some news statements would indeed mark the close of calm reflection so common to farming, and it is the field of the farm press to mirror that mass opinion and to set it right when it feeds on untruth.

IT would seem, therefore, that while the force and following of the usual metropolitan daily editorial writer and his intimacy with his readers has become far less effective, the reverse may be true of the better directors of rural periodicals.

Providing that a farm editor does not have a bias toward simon-pure partisanship or a deaf ear to progress and new economic needs, the response he may get from his better posted patrons will be gratifying indeed. There is little room, of course, for the decadent theorist or the stand-pat scriviner, because so many of his pet platforms are dead issues and the planks are too weak to "stand-pat" upon anyhow. Maybe this is bad medicine for men too old to "reform," and maybe it means younger men at the helm of farm papers. But personally I do not think so, because the last ten years have taught many an old dog new tricks he never thought he could master. Not the age of the scribe, but his personal alertness and vigor, his awareness of mind, and his willingness to move forward—these make up the present qualifications for the rural quill. And above all else, tolerance and patience when things in the news are not quite clear, and again, intolerance and a good display of force when bad news gets worse against the safety of agriculture.

HERE I have come almost to the end of my rope for this issue without working in examples of some of the farm characters whose association in the past decade have recompensed me manifoldly for the financial wealth which I failed to garner en route. I may yet have such a chance, if the public and the publisher permit.

Just the other day a man passed away whose life was spent in allegiance to powerful interests opposed to agricultural welfare. He occupied a handsome suite in the same office building where my simple loft was cornered. Not being a Pharisee, it is not my part to conjecture on his modicum of reward hereafter. All I know about it is that I was welcome in places of abode amid green fields where he was not highly regarded. Not caring further to compare either brains or wealth with him, probably to my confusion, I am willing to look back and be quite content with my own experiences and friendships—truly and simply of the earth earthly.

And not being so old or so wise or so rich in such friends as I hope to become, I look ahead to more fellowship in the furrow.

EXPERIENCE

"Were you scared on your wedding day?"

"Yes, but I've learned since that I was not nearly so much as I should have been."

Teacher—"Robert, what do they raise in Ireland?"

Robert—"I know, but I don't want to say it. Mother tells me I mustn't talk tough."

The sleight-of-hand performance was not going very well.

"Can any lady or gentleman lend me an egg?" asked the conjurer, coming down to the footlights.

"If we 'ad one," shouted a man in the audience, "you'd 'av got it long before this." *London Opinion.*

Visitor (to little girl): "And was your grandpa covered with insurance when he died?"

Little Girl: "No'm; just a night-shirt."

Before marriage she says: "When do we eat?"

After marriage, he says it.

"So the doctor's trial marriage has been found out?"

"Yes, and he's been arrested!"

"What's the charge?"

"Practicing without a license."

SATISFIED

Proud Father: "What shall we call it?"

Fond Mother: "Let's call it Quits."

A beauty expert informs us that a mud bath makes the skin soft, smooth, and silky. We must go down to the zoo again and have another good look at the hippopotami.

A football player in a small college was extraordinarily dumb, but to the surprise of everyone, he passed all of his work, including a special examination in chemistry. The chemistry professor was asked about it, and he said, "I decided I would let him pass if he answered 50 per cent of the questions correctly.

"I asked him two questions—one he answered wrong—one right. Therefore I let him pass. The first was 'What color is blue vitriol?' He answered, 'Pink.' That time he was wrong. The other was 'How do you make sulphuric acid?' He answered that he didn't know. That time he was right."

FATHER SAID NO MORE

Jimmy, I wish you'd learn better table manners; you're a regular little pig at the table."

Deep silence on Jimmy's part. So father, in order to impress him more, added, "I say, Jimmy, do you know what a pig is?"

"Yes, sir," replied Jimmy meekly. "It's a hog's little boy."

MURIATE OF POTASH
80-85% KCl 85-90% KCl 90-95% KCl 95-98% KCl

SULPHATE OF POTASH
90-95% K_2SO_4

SULPHATE OF POTASH-MAGNESIA
48-53% K_2SO_4

MANURE SALTS
30% K_2O

HIGH GRADE KAINIT
20% K_2O

KAINIT
14% K_2O

IT pays to use genuine **NV** POTASH—the same potash that has helped American farmers to produce bigger yields of better quality crops for more than fifty years.

POTASH PAYS · NV · ON ALL CROPS
POTASH EXPORT MY. INC OF AMSTERDAM, HOLLAND
TRADE MARK REG.

N. V. POTASH EXPORT MY., Inc.
19 West 44th St., NEW YORK, N. Y.

Hurt Bldg.
ATLANTA, GA.

Balt. Trust Bldg.
BALTIMORE, MD.

Buckingham Bldg.
CHICAGO, ILL.

Royster Bldg.
NORFOLK, VA.

Lampton Bldg.
JACKSON, MISS.

Agents for Pacific Coast Wilson and Geo. Meyer & Company, San Francisco, California

Printed in U. S. A.